

## Calculating – multiplying decimals by 10, 100 and 1000

When we multiply by 10 the number becomes larger by 1 place value.  
 When we multiply by 100 the number becomes larger by 2 place values.  
 When we multiply by 1 000 the number becomes larger by 3 place values.  
 Look what happens to 45.216 when we apply these rules:

$$45.216 \times 10 = 452.16 \quad 45.216 \times 100 = 4521.6 \quad 45.216 \times 1000 = 45216$$

- 1 Warm up with these. Work with a partner and a calculator. Predict your answers to the following then try out the problems. Your answers will be one or more of the following. The first one has been done for you.

tens      tenths      hundredths      units

What place values are in your answers? Multiply by 10:

- a these units: 6, 3, 1..... We get 60, 30, 10 (tens)  
 b these tenths: 0.6, 0.3 and 0.1..... We get 6, 3, 1 (units)  
 c these hundredths: 0.06, 0.03 and 0.01..... We get 0.6, 0.3, 0.1 (tenths)  
 d these units and tenths: 1.6, 2.3 and 3.4..... We get 16, 24, 34 (tens and units)  
 e these tenths and hundredths: 0.16, 0.23, 0.31 and 0.49..... We get 1.6, 2.3, 3.1, 4.9 (units & tenths)

- 2 Multiply these decimals by 10, 100 and 1000. Estimate first.

	$\times 10$	$\times 100$	$\times 1000$
0.5	5	50	500
0.25	2.5	25	250
0.37	3.7	37	370
1.2	12	120	1200
7.34	73.4	734	7340

- 3 Estimate, then calculate the answers:

a  $10 \times 0.7 = 7$       b  $100 \times 0.9 = 90$       c  $10 \times 0.3 = 3$   
 d  $100 \times 0.15 = 15$       e  $1000 \times 0.27 = 270$       f  $100 \times 0.45 = 45$   
 g  $100 \times 0.255 = 25.5$       h  $10 \times 0.555 = 5.55$       i  $1000 \times 0.178 = 178$

## Calculating – dividing decimals by 10, 100 and 1000

When we divide by 10 the number becomes smaller by 1 place value.  
 When we divide by 100 the number becomes smaller by 2 place values.  
 When we divide by 1 000 the number becomes smaller by 3 place values.  
 Look what happens to 45 when we apply these rules:

$$45 \div 10 = 4.5 \quad 45 \div 100 = 0.45 \quad 45 \div 1000 = 0.045$$

- 1 Divide these numbers by 10, 100 and 1000. Estimate first.

	$\div 10$	$\div 100$	$\div 1000$
50	5	0.5	0.05
25	2.5	0.25	0.025
37.2	3.72	0.372	0.0372
48.5	4.85	0.485	0.0485
542	54.2	5.42	0.542

- 2 Estimate, then calculate the answers:

a  $72 \div 10 = 7.2$       b  $48 \div 1000 = 0.048$       c  $35.2 \div 100 = 0.352$   
 d  $92.05 \div 10 = 9.205$       e  $345.7 \div 1000 = 0.3457$       f  $55.07 \div 100 = 0.5507$

- 3 You'll work with a partner for this activity. You'll also need a calculator. Take turns giving each other a decimal number to transform.

- a Give them the starting number and the number you want it to become.  
 b Your partner then has to do so in one move on the calculator, dividing by either 10, 100 or 1000.  
 c If they can do so, they score 10 points. If they get it wrong, you score 10 points. If you give them a problem that can't be solved by dividing by 10, 100 or 1000, they score the 10 points.  
 d Swap roles. First person to 50 points wins. Record the numbers below:

Answer will vary

OK, start with 163. Turn it into 1.63 in 1 move.



## Calculating – multiplying decimal fractions

How do we multiply decimal fractions using a written strategy?

First we estimate:  $5 \times 3 = 15$ . Our answer will be around 15.

$3 \times 5$  tenths is 15 tenths. We rename this as 1 unit and 5 tenths.

We write the 5 in the tenths column and move the unit to the units column.

$3 \times 4$  is 12. We also add the 1.

$3 \times 4.5 = 13.5$

We check the answer against our estimate. Do they fit?

$$\begin{array}{r} 14.5 \\ \times \quad 3 \\ \hline 13.5 \end{array}$$

## Calculating – multiplying decimal fractions

We can also use renaming to multiply decimal fractions. Look at  $4 \times 3.6$ :

$$\begin{array}{r} 36 \\ \times \quad 4 \\ \hline 144 \end{array}$$

3.6 can also be expressed as 36 tenths.

$36 \times 4 = 144$

Then we convert back to decimals:

144 tenths is 14.4

4 Rename these decimal fractions then multiply. The first one has been started for you.

a  $3 \times 2.7 = 8.1$

2.7 is 27 tenths

$$\begin{array}{r} 27 \\ \times \quad 3 \\ \hline 81 \end{array}$$

$3 \times 2.7 = 8.1$

b  $5 \times 3.4 = 17$

3.4 is 34 tenths

$$\begin{array}{r} 34 \\ \times \quad 5 \\ \hline 170 \end{array}$$

$5 \times 3.4 = 17$

c  $4 \times 9.7 = 38.8$

9.7 is 97 tenths

$$\begin{array}{r} 97 \\ \times \quad 4 \\ \hline 388 \end{array}$$

$4 \times 9.7 = 38.8$

d  $7 \times 1.9 = 13.3$

1.9 is 19 tenths

$$\begin{array}{r} 19 \\ \times \quad 7 \\ \hline 133 \end{array}$$

$7 \times 1.9 = 13.3$

5 Try these. These numbers have hundredths so we will rename the decimal fractions as hundredths. The first one has been done for you.

a  $4 \times 6.12 = 24.48$

6.12 is 612 hundredths

$$\begin{array}{r} 612 \\ \times \quad 4 \\ \hline 2448 \end{array}$$

$4 \times 6.12 = 24.48$

b  $5 \times 3.42 = 17.10$

3.42 is 342 hundredths

$$\begin{array}{r} 342 \\ \times \quad 5 \\ \hline 1710 \end{array}$$

$5 \times 3.42 = 17.10$

c  $4 \times 9.73 = 38.92$

9.73 is 973 hundredths

$$\begin{array}{r} 973 \\ \times \quad 4 \\ \hline 3892 \end{array}$$

$4 \times 9.73 = 38.92$

d  $7 \times 1.94 = 13.58$

1.94 is 194 hundredths

$$\begin{array}{r} 194 \\ \times \quad 7 \\ \hline 1358 \end{array}$$

$7 \times 1.94 = 13.58$

6 Solve these problems:

a Danielle and her twin brothers are each 1.57 m tall. What is their combined height?

$3 \times 1.57 = 4.71$  m

their combined height is 4.71 m

b Your favourite cereal is on special for \$4.55 per box. You wait until your mum is in a weakened state and then masterfully convince her that buying 7 boxes is a great idea. How much will this cost?

$4.55 \times 7 = 31.85$

This will cost \$31.85

Unless there's a zero at the end, if I multiply tenths, I will always have tenths in my answer. If I multiply by hundredths, I'll always have hundredths in my answer. It's a good way to check that my answers are right.



1 Multiply these decimal fractions:

a  $2.6 \times 2 = 5.2$

b  $3.7 \times 4 = 14.8$

c  $5.2 \times 5 = 26.0$

d  $8.4 \times 8 = 67.2$

e  $14.5 \times 3 = 43.5$

f  $24.5 \times 7 = 171.5$

2 Now try these:

a  $3.23 \times 4 = 12.92$

b  $5.33 \times 3 = 15.99$

c  $8.42 \times 8 = 67.36$

d  $7.44 \times 6 = 44.64$

e  $6.28 \times 4 = 25.12$

f  $3.45 \times 8 = 27.60$

3 Use the templates to set up and solve these money problems:

a Yasmin buys 3 cartons of choc milk. Each carton costs \$2.45. How much money does she spend?

$$\begin{array}{r} 2.45 \\ \times \quad 3 \\ \hline 7.35 \end{array}$$

b Lisa buys 4 magazines. Each magazine costs \$4.95. How much does she spend on magazines in total?

$$\begin{array}{r} 4.95 \\ \times \quad 4 \\ \hline 19.80 \end{array}$$

c Omar wants to buy 3 games for his computer. Each game is \$14.95. He has saved \$45. Does he have enough money?

$$\begin{array}{r} 14.95 \\ \times \quad 3 \\ \hline 44.85 \end{array}$$

Yes. He have enough money.